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# A comparative study to assess relation of platelet count, neutrophil and lymphocyte ration as predictor of pre eclampsia in normotensive and pre-eclamptic women

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**Abstract**
**Objectives:** To evaluate the relationship between hypertensive disorders in pregnancy and platelet count and neutrophil to lymphocyte ration and to find out their association with severity of pre-eclamptic disorders in pregnancy.
**Material and Methods:** Study done on 100 subjects, 50 normal pregnant women and 50 pregnant women with varying degree of PIH between January 2017 to December 2017 from antenatal clinic and inpatient ward. During third trimester blood samples were taken every four week for estimating hemoglobin, WBC, cretinine, uric acid, platelets count besides routine investigations.
**Result:** Platelet count decreases, neutrophil and lymphocyte ration increases with increment in severity of hypertension.
**Conclusion:** Pre-eclamptic women have decreased platelet count and increased neutrophil to lymphocyte ration as compared to healthy pregnant women. Thus, estimation of platelet count and N:L ration can be considered as an early economical and rapid procedure of assessment of severity of hypertensive disorders in pregnancy cases and their management which can be done even in rural hospitals.

**Keywords:** Hypertensive disorder, neutrophils, platelet count, lymphocyte, neutrophil – lymphocyte ration

## Introduction
Incidence of hypertensive disorder complicating pregnancy is10-14%. They contribute to mortality as high as 30% in India. Hypertensive disorder of pregnancy is the most common complication in pregnancy & together they from one member of the deadly triad, along with hemorrhage and infection, that contribute greatly to maternal morbidity and mortality rates. HDP is influenced by nulliparity, age, race and obesity. The pre eclampsia, eclampsia and HELLP Syndrome accounted for 44%, 40% and 7% of complications, respectively. Thrombocytopenia is the most common hematological abnormality found in HDP followed by neutrophil and lymphocyte ration. It is common practice to investigate the etiology of symptoms and monitor disease activity by monitoring markers of inflammation. These markers includes
Acute phase proteins The cells involved in innate immunity (leucocytes)
Leucocytes, one of the markers of inflammation are measured clinically as part of a full blood count. Inflammation is "an essential response provided by the immune system that ensures survival during infection and tissue damage". As inflammation is usually initiated by the innate immune system, cells involved in innate response are pivotal in the inflammatory processes.
The activation of neutrophils may occur in the presence of some cytokines (i.e.TNF α) and of some chemo attractants released during an inflammatory process. During neutrophils activation, there is metabolic activation and release of their granules in blood and in tissues, contributing to increase the inflammatory response and/or oxidative stress. However, information related to leukocytes count and its differentials is limited in patients with pre-eclampsia. Based on these conflicting data, the current study was conducted in order to compare platelet count, neutrophil to lymphocyte ratio (NLR) in pregnant women with and without pre-eclampsia.

## Material and Method
This is a hospital based comparative longitudinal study on 50 healthy pregnant women (controls) and 50 women with pre-eclampsia (cases) attending antenatal opd and admitted in labour room and fulfilling inclusion /exclusion criteria and give written and informed consent in obstetrics and gynaecology department S.M.S. Medical College Jaipur from January 2017 to December 2017.

- Inclusion criteria : Normal pregnant women 28-40 wks of GA
- Pregnant women with pre-eclampsia between 28-40 wks of GA were recruited.

The definitions used for pre-eclampsia in this study are those of "ACOG 2014 guidelines of hypertension in pregnancy"

- Exclusion criteria: Patients with history of membrane rupture
- Patients with history of any infection
- Patients with multiple pregnancies were excluded.
- Presence of fetal anomalies and maternal or fetal infection.
- Pregestational and gestational diabetes mellitus.
- Pregnant women with cardiovascular disease, and renal or liver diseases.
- Pregnant women in labour.
- All the patients satisfying the above criteria were selected for the study. The tests were carried out in hospitalized patients and pregnant women attending antenatal clinics.
- A detailed history was taken, general physical and systemic examination including the obstetrics examination. Per speculum examination were done to look for any evidence of vaginal infection clinically. Peripheral venous blood sample were taken. Total and differentials leukocyte counts were measured by an automated hematology analyser along with full blood count. Platelet, Neutrophils and lymphocytes level are measured and neutrophil to lymphocyte ratio in the obtained blood samples are determined. Data were entered in microsoft excel sheet and analysed statistically

## Result

**Table 1:** shows the demographic and clinical data in study groups

| Variables | Pre-eclamptic group | Control group | P-Value |
|---|---|---|---|
| Age in years | 27.60 ± 6.47 | 26.98 ± 6.33 | 0.502 |
| Parity | 0.87 ± 1.04 | 1.07 ± 1.09 | 0.104 |
| BMI (kg/m ²) | 24.1 ± 3.6 | 23.5 ± 1.5 | 0.23 |
| Gestational wks | 35.3 ± 2.6 | 37.9 ± 1.3 | 0.0003 |
| Systolic BP, mm Hg | 156.44 ± 13.8 | 108.16 ± 11.15 | <0.001 |
| Diastolic BP, mm Hg | 101.39 ± 9.73 | 67.54 ± 7.55 | <0.001 |

**Table 2:** shows age distribution in cases and controls

| Age Group | Frequency in normal pregnant women | Percentage% | Frequency in 'pre-eclamptic women | Percentage % |
|---|---|---|---|---|
| <20 yrs | 4 | 8% | 7 | 14% |
| 21 – 25 yrs | 11 | 22% | 21 | 42% |
| 26 – 30 yrs | 26 | 52% | 13 | 26% |
| 31 – 35 yrs | 13 | 26% | 6 | 12% |
| 36 – 40 yrs | 6 | 12% | 3 | 6% |
| Mean ± SD | 27.14±4.06 | | 24.26±5.17 | |

**Table 3:** shows gestational age distribution in study group

| Period of gestation on admission | Frequency in cases | Percentage | Frequency in controls | Percentage |
|---|---|---|---|---|
| 28 to 32 wks | 5 | 10% | 3 | 6% |
| 33 to 36 wks | 24 | 48% | 20 | 40% |
| 37 to 38 wks | 18 | 36% | 20 | 40% |
| 39 to 40 wks | 3 | 6% | 7 | 14% |

**Table 4:** shows FBC comparison

| variables | Pre-eclampsia | Normal pregnant | P value |
|---|---|---|---|
| Haemoglobin | 11.46 ± 1.30 | 11.09 ± 1.22 | 0.172 |
| platelet (lakh per dl) | 1.6 ± 0.1 | 2.5 ± 0.5 | 0.001 |
| WBC ($10^3$ per ml) | 13.34 ± 3.39 | 9.76 ± 2.01 | 0.051 |
| Neutrophils ($10^3$ per ml) | 11.01± 3.28 | 6.80 ± 1.80 | 0.025 |
| Lymphocyte($10^3$ per ml) | 1.65± 0.45 | 2.23± 0.51 | 0.04 |
| NLR | 7.39± 3.51 | 3.20 ± 1.08 | 0.01 |

## Conclusion

The median NLR value of the pre-eclampsia group was significantly higher than that of the control [7.39±3.51 vs 3.20±1.08; $p$<0.001] As shown in the current study, WBC count of pre-eclamptic women were higher than those of the women with normal pregnancy, suggesting an increased inflammatory response in pre-eclampsia. In the present study NLR was found to be significantly higher in patients with pre-eclampsia than control healthy pregnant women. Full blood count are routinely performed in pregnant women at the beginning of their pregnancy. Not only do they usually take place before 16 wks gestation (that is, before placentation is completed) but also, the test is relatively cheap. Given that this study has shown the neutrophil to lymphocyte ratio is increased in women who has pre-eclampsia, this may serve as a predictor for the disease. Finally to conclude, pre-eclamptic women have decreased platelet count as compared to healthy pregnant women. These finding suggest that there is an abnormal vascular tone with resultant accelerated platelet destruction, platelet activation and coagulation defects in pre-eclampsia and are involved in pathogenesis of the condition.

In antenatal follow- up, measurement of platelet count and NLR periodically may be useful to predict high risk pregnancies in terms of pre-eclampsia. Hence establishing cost-effective bio-

markers help in early prediction of disease which in turn helps in early treatment and slow down progression of disease. However, large scale prospective study needed to determined the optimal platelet and NLR value and its prognostic significance in the diagnosis of pre-eclampsia. Thus, platelet count and NLR ration estimation can be a cost effective method for predicting severity of pre-eclampsia and can be used in routine monitoring especially in poor resource settings.

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